

100	processing system
102	plasma etching system
104	process monitor system
106	chamber
108	plasma etch system controller
110	recipe control port
112	first control bus
114	viewport
116	plasma electromagnetic emissions
118	plasma
120	spectro-meter
122	processor
126	electromagnetic emissions collector
128	fiber optic cable
130	second control bus
132	user
134	third control bus
136	fourth control bus
1000	fifth control bus
700	calibration process
702	start calibration run
704	perform calibration process
705	start correlated OES and RF data collection
706	perturb the process
708	terminate correlated OES and RF data collection
710	identify time periods

712	perform PCA on collected data
714	identify steady principle components
716	has the number of desired perturbation been reached?
718	determine the need for signal enhancement
720	perform OES and/or RF data enhancement
722	perform RCA on modified data
724	designate identified principle components
730	end
900	Method for automatic determination of semiconductor plasma chamber matching and source of fault by comprehensive plasma monitoring
902	start study run
904	perform calibration process
905	start correlated OES and RF data collection
906	perturb the process
908	terminate correlated OES and RF data collection
910	perform OES and/or RF data enhancement
912	perform PCA on collected data
914	identify steady principle components
916	perform inner product of correlated non-reference PCs
918	has the number of desired perturbation been reached?

920	matching scores pass matching control limit?
922	chamber matched
924	chamber not matched
1100	chamber fault diagnosis method
1102	start fault diagnosis run
1104	perform calibration process
1105	start correlated OES and RF data collection
1106	perturb the process
1108	terminate correlated OES and RF data collection
1110	perform OES and/or RF data enhancement
1112	perform PCA on collected data
1114	identify steady principle components
1116	perform inner product of correlated, non-reference PCs
1118	has the number of desired perturbation been reached?
1120	compare all matching scores
1122	verify if the perturbed parameter(s) of the lowest score(s) is/are the source(s) of fault
1200	source(s) of fault diagnosis method
1202	start source(s) of fault matching
1204	retrieve the PCs of the perturbed parameters
1206	search the library
1208	perform inner product of PCs of the

	chamber under study
1210	matching scores pass matching control limit?
1212	are there more stored diagnosis runs to match?
1214	source(s) of fault possibly similar to the matched diagnosis run retrieved from the library
1216	no matching found case needs to be studied by expert